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Look Ma, No Wires!

By Steve Muenstermann and Ellen Fussell Policastro

Pharmaceutical and diagnostics companies switch to wireless for safety, compliance

Medicine production and medical diagnostics are two industries where precision and reliability are a must. Meeting safety requirements and complying with federal regulations are a large part of the task. Yet wireless still comes out on top, as two companies in the medical manufacturing arena prove in their process transitions to wireless technology. ZLB Behring, a pharmaceutical company specializing in the manufacture of plasma products, and Roche Diagnostics, a research company developing diagnostics for breakthroughs in healthcare, relied on wireless to solve safety issues and meet compliance regulations, as well as increase access and availability of data for improved decision-making.

ZLB's line of therapies include products for the treatment of hemophilia and other coagulation disorders, immunoglobulins for the prevention and treatment of immune disorders, treatments that inhibit the formation of blood clots, wound-healing agents used during major surgical procedures, and plasma expanders for the treatment of conditions such as shock, burns, and circulatory disorders.

ZLB's alcohol tanks sit outside rather than in an enclosed area, which affects the environment. Searching for a way to better monitor its alcohol tank levels and reduce safety risks to employees, they decided to eliminate one of the cycle's most routine tasks—manual alcohol tank monitoring.

Virgin alcohol arrives at the facility via railroad and unloads into storage tanks. For the next five to seven days, the alcohol sees use in the processing and refining of the end product. The process alcohol goes through cleaning and redistilling before going back onto another set of rail cars and shipping to distributors.

Before employing wireless technology, employees would walk up narrow stairways to the tops of the 50-year-old, 10,000-gallon storage tanks, which stand about 15-ft high. They'd open a 6-in portal and lower in wooden sticks with lines marking every quarter inch to measure the alcohol levels. "We've got people walking out to these tanks in the rain and snow and whatever else," said Jeff Dabney, senior process engineer at ZLB's Kankakee, Ill., facility.

The intense alcohol concentration within threatened a risk of explosion and a potential safety risk for employees who would manually check the alcohol levels. Also, because the 12 tanks at the facility were outdoors, the company needed to comply with Environmental Protection Agency (EPA) mandates that regulated how much vapor it released into the air.

"Sending an operator out on a daily basis to measure our tanks presented a fire hazard and was simply no fun on a very cold morning," Dabney said. "Grounding straps must be worn each time the tanks are opened, and on warm days, the vapor coming from an open tank is also dangerous."

Not only was ZLB searching for a system to lessen the safety risk to employees and remain compliant with EPA regulations, the company also wanted to keep better track of its inventory.

"We had a big challenge finding a level measuring system to run into our Class 1 Div 1 area that did not involve thousands of dollars in intrinsic barriers alone," Dabney said. Since the application was outside, crossing several roads, "trenching was out of the question, and large trucks are used, so this would

mean a large expense in putting up an overhead conduit system. The costs of wiring prevented us from doing the project for a long time."

Within the year, the company had implemented a wireless solution, which was always the preference, Dabney said, because it "allows us to monitor our tanks on a real-time basis rather than an operator hand measuring the tank levels once a day. We can now make a much better inventory of our process liquids."

The transmitters are basically the same costs, "but the cost of the wiring, running 300 feet or 400 feet of cable or conduit would have been cost prohibitive," he said. The wireless base now sits about 300 yards away from the storage tanks next to a cooling tower on the facility campus. Pressure transmitters sensing the weight of the alcohol in the tanks send the data to the wireless base, which then transmits the numbers to a programmable logic controller. Employees can view the data any time on a computer screen versus manually checking levels, which solves the safety issue. Also, the wireless transmitters enable the company to emit even less alcoholic vapors into the air because workers no longer have to physically open the tanks to take measurements.

Dabney's advice to other manufacturers thinking about wireless is to "do a thorough site survey when designing the location of the base unit. This was the only real challenge when installing our system," he said. "We had a cooling tower between the base unit and the sensors that was inactive when we started the install in early spring," he said. "As the weather warmed up and the cooling tower was turned on, our signal strength was a real problem. We moved the base unit to a true line of site arrangement and have not had any issues since."

Diagnostics complies with wireless

Roche Diagnostics, headquartered in Indianapolis, has been active in the discovery, development, manufacture, and marketing of healthcare solutions for over 100 years. The company's products and services address prevention, diagnosis, and treatment of disease. The company needed to meet stringent U.S. FDA compliance regulations, as well as increase access and availability of data for improved decision-making. The goal was to upgrade its temperature monitoring to an integrated, networked system of sensors at its Indiana facility. With a building already equipped with a system of electronic temperature and humidity monitors, they first considered a wired application but soon learned they had to design for flexibility.

Wireless transmitters were the best choice because the company could change with the facility needs if they wanted to reconfigure equipment or warehouse operations. Wireless transmitters also enabled the company to reduced installation, operational, and maintenance costs. The data helped meet and maintain regulatory compliance by allowing timelier, more consistent, and more accurate measurements and easy access to critical warehouse data through a server linked to the main network for remote availability. They also were able to eliminate paper charts, which freed up employees to address more critical concerns.

The new wireless equipment efficiently transmits by frequency hopping, using sensors and bases that communicate through randomly alternating frequencies like the 900 MHz range. "Transmission at Roche has been clear and uninterrupted despite hard-to-reach locations of various sensors," said Chris Upwards, Roche's manager of process engineering.

To guarantee information redundancy and constant uptime, the company connected base radios with coaxial cables to remote transmission units (RTUs). Data then passed through Roche's LAN, completing the implementation and validation process in less than four months.

Upwards said team members find the solution useful because "we know we have a system that complies with regulatory requirements and provides us with the ability to generate accurate data and act on that data from any remote location," he said.

About the Authors

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FAST FORWARD

- Reliability issues lose ground as wireless ramps up in the healthcare manufacturing arena.
- Pharmaceutical company uses wireless to keep workers and environment safe.
- Healthcare diagnostics company looks to wireless for FDA compliance.

Oil greets environment with wireless

Repsol is an integrated oil and gas company operating in Latin America, the Middle East, and North Africa. The firm owns YPF, Argentina's top oil company, and has operations in more than 28 countries. Repsol YPF operates five refineries in Spain and four in Latin America and produces chemicals, plastics, and polymers. It sells gas under the brands Campsa, Petronor, and Repsol at more than 6,900 service stations in Europe and Latin America.

In 2004, the company completed an underwater pipeline crossing the Colorado River in the Puesto Molina production area and installed one oil pipeline, two gas pipelines, and an aqueduct, 585 miles long, under the river. Security and environmental standards required Repsol to maintain accurate monitoring of the pipelines to avoid possible spills into the river in the event of a pipe breakage.

Repsol considered using pressure transmitters to sense pressure on the pipelines, but the costs of mounting and maintenance were prohibitive. Wireless transmitter technology offered significant advantages when used for measurement and monitoring of applications, and was designed for applications with little to no access to power, hazardous, or remote locations where instrumentation changes are frequent or where they usually take manual readings.

Security and environmental standards required an accurate monitoring of the pipelines to avoid possible spills into the river in the event of a pipe breakage. To solve the problem, Repsol implemented continuous monitoring of pipeline pressure and integration into a SCADA reporting system as part of the control system.

Stretching about 620 miles, the Rio Colorado starts in the eastern slopes of the Andes Mountains in Argentina and winds its way east-southeast into the Atlantic Ocean. The path travels directly through the Puesto Molina production area, a sector that belongs to Repsol YPF's Rincon de los Sauces Oil Fields. At the Puesto Molina area, the Rio Colorado is the physical boundary between the Mendoza and Neuquen provinces.

The Economic Unit Rincon de los Sauces is located in western Argentina. It covers an area located in the north part of the Neuquen province, south of Mendoza and northwest of Rio Negro. It consists of mature oil fields where the extraction occurs through secondary recovery. Its output is 188.000 m3/per day gross production with a net petroleum production (35 API) of 11.000 m3/per day. The Puesta Molina production area contains 1,147 producing wells, of which 70% are the mechanical pumping (AIB) type. There are 787 water injection wells.

At the Mendoza Head, Repsol used pressure transmitters with 4-20 mA outputs to sense the pressure, and it also installed a new remote terminal unit (RTU) to send the data to the SCADA system. Meanwhile, at the Neuquen Head, the company used the same type of transmitters, but used wiring and cable to connect them to an existing RTU located in a water-injection well 50 meters away.

After completing the engineering design concepts for both options, Repsol chose a wireless implementation because of its lower installed cost versus the traditional wired implementation. In this case, the mounting and start-up costs were reduced from $17,840 to $11,300—a 36.7% savings. Repsol used an existing RTU near the Neuquen Head to mount a radio base and used wireless pressure

transmitters in both heads.

The company used a DCS, wireless pressure transmitters, and other transmitters with 4-20mA output in order to accurately maintain the pipeline monitoring. The wireless pressure measurement solutions helped remove the barriers to installation and start-up costs while still providing a secure monitoring system. The new system also reduced costs by more than 37% in development, installation, engineering, mounting, start-up, and maintenance. The company also increased data and measurement reliability by eliminating data transmission faults. Other results included a 50% reduction in maintenance costs and removal of barriers to monitoring variables where traditional technology was too costly to implement.

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